Communication and Uncertainty Management

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The fundamental challenge for refining theories of communication and uncertainty is to abandon the assumption that uncertainty will produce anxiety. To better explain processes of communication and uncertainty management, we must answer questions about (a) the experience and meaning of uncertainty, (b) the role of appraisal and emotion in uncertainty management, and (c) the range of behavioral and psychological responses to uncertainty. This paper outlines and extends a theory of uncertainty management and reviews current theory and research in this area. In addition to the theoretical advances promised by this perspective, the paper describes applications to health communication practice. The drive in disease prevention to reduce uncertainty about the state of health and illness has led to a "culture of chronic illness." Constant surveillance of people's health, combined with improved methods for screening and monitoring, virtually guarantee finding something wrong with every person, creating a society divided into the chronically ill and the worried well (i.e., those waiting to be diagnosed).

When making decisions, planning events, and interacting with others, people experience uncertainty. Decision alternatives may appear equally attractive (or equally unattractive) if people lack the information needed to distinguish them. Important event contingencies frequently are probabilistic ("Is it likely to rain if we have the reception outdoors?") and differently valued ("Would it be good or bad if it rained?"; see Babrow, 1992, for a discussion of probability and value in determining human action). The behavior of interactional partners may be unpredictable, perhaps because people communicating with new acquaintances lack information on which to base their judgments or because they witnessed inconsistencies during prior interactions with others. In many such situations, people encounter the complexity that characterizes everyday life.

Communication researchers have turned their attention to questions about the forms of uncertainty experienced in different contexts and the varied behavioral

options that might facilitate uncertainty management. New ideas in these areas, including those in this special issue, represent progress over the more narrow conceptualization of communication in uncertainty reduction that has dominated our research over the past 20 years or so. Because "reducing uncertainty" is only one of an indefinite number of responses to events or behaviors that are unpredictable, ambiguous, equivocal, or lacking information, it should be subsumed in a broader theory of communication and uncertainty management (Brashers & Babrow, 1996; Brashers, Neidig, Haas, et al., 2000). Although people quite often do want to reduce complexity and ambiguity in their lives, perhaps as a prerequisite to decision making, planning, or predicting the behavior of others, there are other times when uncertainty allows people to maintain hope and optimism or when tasks can be performed despite, or because of, uncertainty. The field's historic focus on uncertainty reduction is both a cause and symptom of underdeveloped ideas about uncertainty and methods of managing it (also see Bradac, this issue; Goldsmith, this issue).

To better explain processes of communication and uncertainty management, we need to address questions about (a) the variability in uncertainty experiences and meanings, (b) the functions of appraisal and emotion in uncertainty management, and (c) the range of behavioral and psychological responses to uncertainty. The purpose of this paper is to argue for continuing elaboration of these conceptual areas within a theory of uncertainty management. To accomplish this aim, I first describe contributions of recent theory and research on uncertainty and communication and discuss opportunities for further extension and elaboration within each area. Next, I argue that there are important consequences of these ideas for addressing "real world" problems related to uncertainty management, providing an example from health education and disease prevention efforts. Finally, I summarize the implications of these ideas for theorizing about communication and uncertainty management.

The Nature of Uncertainty

Uncertainty exists when details of situations are ambiguous, complex, unpredictable, or probabilistic; when information is unavailable or inconsistent; and when people feel insecure in their own state of knowledge or the state of knowledge in general (see Babrow, Hines, & Kasch, 2000; Babrow, Kasch, & Ford, 1998). Because it is primarily a self-perception about one's own cognitions or ability to derive meaning, a person who believes himself or herself to be uncertain is uncertain. Lacking knowledge is somewhat independent of self-assessment about one's state of knowledge: I may have a great deal of information about a topic, I may have an amount of information that other people would deem sufficient to make a decision or to predict another's behavior, and I even may have all the information that is currently available, yet I still may feel uncertain.

Uncertainty also might be experienced when a person assesses the probability of an event (Babrow, 1992). A curvilinear relationship exists between beliefs about probability and uncertainty, such that uncertainty is lowest when the probability of occurrence is believed to be 0% or 100% and highest when the probability of occurrence is believed to be 50%. Individuals who are certain are those who

"know" an event will or will not occur. They experience increasing uncertainty as the likelihood of the event occurring or not occurring becomes equal. If multiple alternatives are possible, uncertainty is highest when all events seem equally probable.

Understanding various types of uncertainty enhances our ability to describe and explain its influences on behavior and to develop strategies for improving people's lives. These ideas are useful in a wide variety of domains that interest communication scholars. By way of illustration, the following paragraphs review applications to health, organizational, and interpersonal settings.

In our work, my colleagues and I described uncertainty for persons living with HIV, so that we can develop explanations for the communication processes that facilitate and hinder its management. Many forms of uncertainty are experienced in chronic and acute illnesses (Babrow et al., 1998; Mishel, 1988, 1990, 1999). For people with HIV, subjective symptoms can be attributed to numerous causes, the stigma of the disease might create fear of rejection and social isolation, the trajectory of the illness is highly variable across persons, and most treatments are considered experimental, which leads to questions about their safety and efficacy (Brashers, Neidig, Reynolds, & Haas, 1998). Even radical improvements in health (which we labeled "revival") are a source of uncertainty in illness (Brashers et al., 1999). People who experience renewed health often worry about recurrence of their illness, their ability to return to the stresses of daily living, and the effects of improved health on social relationships (also see Ford, Babrow, & Stohl, 1996).

Medical decision making is a related context in which uncertainty is typical (Babrow et al., 1998; Hines, this issue; R. C. Fox, 1998, 2000). Health care providers and patients both encounter complexity and ambiguity in decisions about diagnoses and treatment options (Mishel, 1988, 1990), which may be a cause of medical malpractice claims (Fielding, 1999). The etiology of disease includes various possible biological and psychosocial factors (Waitzkin, 1991), symptoms may be attributed to numerous different diseases or to no known cause (Peters, Stanley, Rose, & Salmon, 1998), and physicians may offer different diagnoses when assessing the same symptom pattern (McKinlay et al., 1998). Treatment options vary, and their corresponding efficacy may be debated (e.g., controversy over the use of various treatments for breast cancer).

Understanding the nature and forms of uncertainty also illuminates organizational communication (see McPhee & Zaug, this issue). Organizational life includes uncertainty about how to do a job, what to expect in performance appraisals, and how to manage relationships with others (Teboul, 1994). Researchers have characterized uncertainties at particular points in the organizational career cycle, such as role ambiguity and unfamiliarity with policies during organizational entry (Mignerey, Rubin, & Gorden, 1995) and job transfers (Kramer, 1993a, 1993b, 1996), unknown probability of effectively implementing innovation and change (Albrecht & Hall, 1991; Ellis, 1992; Lewis & Seibold, 1996, 1998), or uncertainty about job security following a reduction in workforce (Casey, Miller, & Johnson, 1997; Heaney, Israel, & House, 1994). At the macro-organizational level, decision making typically reflects environmental risks and ambiguities. The stability of the economy or market, availability of resources, or probability of competing

innovation can determine growth and sustainability of the organization (Giarni & Stahel, 1989).

Of course, uncertainty management is key to interpersonal communication as well (Baxter & Montgomery, 1996; Berger & Bradac, 1982; Marris, 1996). People in relationships experience interactional uncertainty about their own and others' communication skills and abilities, goals, plans, affective states, and beliefs (Berger, 1995). Cross-cultural encounters are affected by insufficient or incomplete knowledge about cultural practices or language differences (Goldsmith, this issue). Partners in intimate relationships may question variation in relational closeness over time, their partners' fidelity, possible revelations of intimate disclosures to others outside the relationship, and incongruent partner/self perceptions about the state of the relationship (Planalp, Rutherford, & Honeycutt, 1988). Close friends potentially face uncertainty about the meaning of affection displays or the possibility of sexual tension in their relationship (Afifi & Burgoon, 1998).

The unpredictable, complex, and ambiguous aspects of health, organizational, and relational contexts suggest directions for further research on the variability in meaning and experience of uncertainty within three areas (also see Babrow, 1992, 1995; Lazarus & Folkman, 1984). First, further research is needed to examine the contention that uncertainty is multilayered. As Brashers and Babrow (1996; also see Babrow, 1992, 1995) noted, "participants are embedded in layers of context that can produce complementary and contradictory forces" (p. 249). Uncertainty can be about the self (e.g., one's own beliefs, values, abilities, and behaviors), others (e.g., others' beliefs, values, abilities, and behaviors), relationships (e.g., the quality and durability of relationships), and other features of a context (e.g., rules, social norms, and procedures). People with illnesses may question their own ability to manage the illness, their provider's diagnostic skills and beliefs about treatment, their relationship with the provider (e.g., paternalistic or consumeristic), and the meaning of tests and procedures in health care. In work settings, people may feel uncertain about their ability to perform a task, their supervisor's leadership style, the need for formality in their interactions with those higher in the hierarchy, and the organization's rules for promotion or tenure. Individuals in new relationships may question their own and their partner's definition of the relationship, the potential for long-term commitment, or the appropriateness of suggesting sexual intimacy.

Second, theories of uncertainty management need to examine the ways in which uncertainties are interconnected (cf. Hines, this issue). Babrow (1995) discussed the "chaining from one focal dilemma to others," which might result from integrating "particular probability and value judgments into surrounding belief, value, and intentional structures" (p. 287). Complications of health status, such as ambiguous symptoms, unclear diagnosis or prognosis, or lack of information on treatment options, can create uncertainty about financial well-being, the social reactions of others, and future changes in health status. Questions about disease diagnosis bring about ambiguity in treatment decisions. Unclear instructions about task performance in organizations might be associated with uncertainty about performance appraisal. Variability in relational closeness can cause people to question their partners'

fidelity or the congruence between their own and their partners' perceptions about the relationship.

Third, there are temporal dimensions to uncertainty that need to be examined. Uncertainties can be short-lived or ongoing (i.e., acute or chronic; Lazarus & Folkman, 1984; Mishel, 1988, 1990). Microinteractional forms of uncertainty occur ("How will she respond to this statement?"). Short-term uncertainty can be for the duration of a limited event ("Will I survive this surgery?"). Ongoing uncertainty spans the trajectory of a chronic illness, the life cycle of a career, or the duration of relationship. There can be evolutionary or revolutionary changes in the experience across time: Uncertainty can be created and managed during a conversation (Afifi & Burgoon, 2000), it may transform suddenly as one issue is resolved and another takes its place (Babrow & Kline, 2000), and the subtle meanings of uncertainty can shift over time as people become accustomed to it (Mishel, 1990). Various forms of uncertainty may be more or less salient during different stages of an illness, a relationship, or a career, and at times the experience of one form of uncertainty might overwhelm concern about another.

Because uncertainty is multilayered, interconnected, and temporal, the appropriateness and effectiveness of responses used to manage it are likely to vary across contexts and situations (see Babrow et al., 2000). These dimensions of the experience require that people develop responses sensitive to multiple goals and tasks. The layers of context suggest that people experience multiple sources of uncertainty at once, that manipulation of one type of uncertainty can impact (e.g., increase or decrease) uncertainties of other types, and that experiences of uncertainty are ongoing and changing features of life.

Appraisal and Emotion in Uncertainty Management
Responses to uncertainty are shaped by appraisals and emotional reactions to the experience. Theories of appraisal suggest that people judge the meaning of an event based on its relevance to their lives (Lazarus & Folkman, 1984; Mishel, 1988, 1990) and on the likelihood and evaluation of the event (Babrow, 1992). Uncertainty appraisals may be situational (Brashers, Neidig, Haas, et al., 2000) or dispositional (e.g., uncertainty orientation, see Sorrentino & Roney, 2000). For example, people with HIV (Brashers, Neidig, Haas, et al., 2000) or spinal cord injury (Parrott, Stuart, & Cairns, 2000) may assess uncertainty about treatment effectiveness negatively whereas uncertainty about long-term prognosis might be positive (e.g., because it might support optimism). Kramer (1999) proposed that people in organizations have different levels of motivation to reduce uncertainty, partly determined by the appraisal of uncertainty as positive, negative, or neutral. Baxter and Montgomery (1996) concluded that uncertainty often is valued in interpersonal relationships because of its connection to spontaneity or novelty, different dyads may tend to favor certainty or uncertainty, and the meaning of certainty and uncertainty may change over the span of a relationship (also see Afifi & Burgoon, 1998).

These distinctions suggest that affective responses are associated with uncertainty appraisals (Babrow, 1992; Brashers, Neidig, Haas, et al., 2000). Although much of the research to date on uncertainty and communication confounds un-

certainty and anxiety (e.g., Gudykunst, 1995), a range of emotional responses clearly is possible. *Negative emotional responses* signal a troubled appraisal when uncertainty is viewed as a danger or threat. For example, uncertainty can cause anxiety if it precludes effective decision making and fear if it threatens health and safety. Extreme threat can result in panic or torment. Insecurity can accompany personal acknowledgement of uncertainty. *Positive emotional responses* result when uncertainty is framed as beneficial. People who are uncertain, yet believe that a bright future is one possibility, feel hope or optimism. *Neutral emotional responses* such as indifference correspond to uncertainty judged to be inconsequential. *Combined emotional responses* (Lazarus, 1991) can arise when positive and negative affect co-occur (Folkman, 1997). When uncertainty represents elements of both danger and opportunity, the emotional response may be thrill (a combination of excitement and fear), which characterizes high-risk activities like skydiving or bungee jumping.

Appraisals and emotional responses to uncertainty can shift across time, perhaps when new information is obtained or when uncertainty is reappraised (Brashers, Neidig, Haas, et al., 2000). For example, anxiety turns to fear if uncertainty is not resolved or if additional threatening information is uncovered. Anxiety can change to resignation if there appears to be no way to resolve uncertainty (e.g., because no information is available or because new information contradicts current beliefs). Anxiety turns to hope when new information allows people to reframe their experiences or when they accept uncertainty as a natural part of life (Mishel, 1990).

Engaging in Uncertainty Management

Communication in uncertainty management follows from appraisals and emotional responses; it encompasses managing uncertainty that is challenging, managing uncertainty that is essential for maintaining hope, learning to live with chronic uncertainty, and managing information problems (Brashers, Neidig, Haas, et al., 2000). For example, messages that inspire fear (Witte, 1998) or guilt (O'Keefe, 2000) can motivate people to act in ways to reduce those emotions (e.g., changing to healthier behaviors or complying with personal requests). Theories of uncertainty management processes need to elaborate ideas about (a) seeking and avoiding information, (b) adapting to chronic uncertainty, (c) obtaining assistance with uncertainty management through social support, and (d) managing uncertainty management.

Seeking and avoiding information. Information can be used to manipulate uncertainty in a desired direction (e.g., to increase, decrease, or maintain it; see Brashers, Neidig, Haas, et al., 2000). Langer (1994) noted that "information gathering serves the purpose of differentiating options, finding options, and creating options" (p. 45). People seek information to add knowledge they lack or to confirm or disconfirm their current state of beliefs, and they use that information for strategic purposes (Heyman, Henrikson, & Maughan, 1998). To decrease uncertainty, information can serve to distinguish options, making one appear more attractive or more likely than another. Information also can decrease uncertainty when it allows people to develop meaning for an event, such as explaining a

mysterious symptom pattern (Brashers, Neidig, Haas, et al., 2000). Information does not need to be "correct" to reduce uncertainty (as Planalp & Honeycutt, 1985, p. 543, noted, "knowledge that is held with extreme certainty is often inaccurate"), but at some level it needs to create perceptions of coherence. To increase uncertainty, people may intentionally seek information to contradict their current beliefs or add new alternatives for consideration (Frey, Schulz-Hardt, & Stahlberg, 1996; Kruglanski, 1989).

Information-seeking behavior ranges from more to less direct methods (Miller & Jablin, 1991), such as asking a person for information about himself or herself, observing behaviors of the person, or asking others about the person (Berger & Bradac, 1982). Methods of eliciting information include question asking (Berger & Kellermann, 1983; Douglas, 1987), self-disclosure or relaxation of the target (Kellermann & Berger, 1984), offering a candidate answer (Pomerantz, 1988), or second guessing (Hewes, Graham, Monsour, & Doelger, 1989). Often labeled as powerless communication, language styles such as hedges, hesitations, tag questions, or the expression of probabilities can indicate a state of uncertainty (C. R. Fox & Irwin, 1998; F. L. Johnson & Davis, 1980; Michael, 1994; Sherblom & Van Rheenen, 1984), which can serve as passive information seeking. Hardesty and Geist (1990) examined physician behaviors used to manage uncertainty about diagnosis, treatment, and communication decisions and found that self-appraising talk that reflects uncertainty, mistakes, or a lack of knowledge is common in conversations between physicians and patients and between physicians and specialists. They argued that disclosure of self-appraisal can be classified as information seeking and references to a lack of knowledge can initiate discussions with specialists.

Variability in types and sources of information is also important to uncertainty management. Individuals may choose some sources of information over others because they believe there are differences in the efficacy of the sources or because some sources are more readily available and familiar than others. In health care settings, individuals often prefer different sources of information (e.g., physicians, nurses, friends, families, pharmacists, or web sources) for each distinct facet of illness (e.g., J. D. Johnson & Meischke, 1994) and they may prefer different types (Degner et al., 1997) or sources of information (Luker, Beaver, Leinster, & Owens, 1996) at different stages of illness. In the organizational context, organization members may use both intra- and extra-organizational information sources (Teboul, 1994), different information-seeking tactics may be used for interacting with different information sources (Miller, 1996), and preferences for different sources (Teboul, 1994) and types (Morrison, 1995) of information may be linked to various forms of uncertainty.

Avoidance can shield people from information that is overwhelming and distressing and can provide escape from a distressing certainty by maintaining uncertainty. These behaviors include direct information avoidance (Mishel, 1988), selective attention (Ratneshwar, Warlop, Mick, & Seeger, 1997), selective ignoring (Mishel, 1988), and social withdrawl (Brashers, Neidig, Haas, et al., 2000). Information avoiding might also be thought to include methods of suppressing currently held knowledge, such as thought suppression (Wenzlaff & Wegner, 2000) or intentional forgetting (Golding & MacLeod, 1998). Discounting negative informa-

tion (e.g., by discrediting the source, comparing the current situation to a past instance of failed prediction, or thinking of oneself as unique) can be a form of indirect avoidance (Cohen, 1993). Avoidance acts can be conscious or unconscious attempts at maintaining or increasing uncertainty, but at some level they are goal directed; failing to seek information is not the same as avoiding it.

Adapting to chronic uncertainty. As noted previously, uncertainty can be ongoing, such as over the trajectory of a chronic illness, through the course of a relationship, or spanning a career. Across these domains, accepting uncertainty is an adaptive mechanism (Mishel, 1990). In a study of parents of men living with HIV, participants reported learning to appreciate uncertainty by "keeping reality at a tolerable level, so they could function in their 'comfort zone' and cope with the day-to-day horror, fear, and uncertainty while attending to their son" (Siegl & Morse, 1994, p. 959). Mumby and Putnam (1992) described a form of bounded emotionality in organizations which includes tolerance for ambiguity. As part of a larger typology of relational repair strategies, Emmers and Canary (1996) inductively derived a list of "uncertainty acceptance" behaviors, including having trust in one's partner, ignoring the uncertainty-producing event, and relying on faith or a higher power. These studies demonstrate that people can both tolerate and appreciate uncertainty as an ongoing feature of their lives.

Adapting to chronic uncertainty also includes redefining tasks. If people cannot achieve predictability in their lives, they can change the way they plan or make decisions. Participants in our study of people with HIV described planning for a shorter duration and for events with immediate consequences, rather than planning for long-range goals or activities with long-term payoffs (Brashers, Neidig, Haas, et al., 2000). People also can make decisions and form plans despite uncertainty through inferences, either from incomplete reasoning or incomplete evidence, and can reach conclusions by computation, reasoning, or judgment (Smith, Benson, & Curley, 1991). They also may need uncertainty to make decisions because the ambiguity of alternatives may help them avoid focusing on the potential negative consequences of a decision. Finally, people can use heuristics to make choices (Elstein, 1999), rely on minimal information and the search for a "good enough" solution (Pierce, 1996), or simply ignore uncertainty in their planning and decision making (Hougland & Shepard, 1980).

People also buffer the effects of uncertainty by developing structure and routines, building a "cocoon of certainty" to shield themselves from the complexity of life (Merry, 1995, p. 128). For example, stereotyping is a form of mindless behavior (see Langer & Weinman, 1981) that encourages use of familiar and recognizable patterns for meaning development. Hines, Babrow, Badzek, and Moss (1997) found that physicians and patients enact stereotypical roles in their interactions when faced with uncertainty, and Kramer (1999) proposed that people in organizations manage uncertainty by developing certainty through stereotyping. Others suggest that people rely on the familiar to provide structure, such as when organizations respond to environmental uncertainty by more strictly enforcing rules and regulations (Merry, 1995).

Social support as assisted uncertainty management. Social support processes are important to psychological and physical health (Brashers, Neidig, & Gold-

smith, 2000), for organization members (Albrecht & Hall, 1991; Albrecht & Halsey, 1992), and in interpersonal relationships (Burleson, Albrecht, Goldsmith, & Sarason, 1994). Supportive others facilitate uncertainty management with messages and behaviors that increase and decrease certainty and uncertainty (Albrecht & Adelman, 1987; Ford, Babrow, & Stohl, 1996). Social support behaviors act upon either the experience of uncertainty, appraisal processes, or the selection of uncertainty management behaviors (Brashers, Neidig, & Goldsmith, 2000). Supportive others affect the experience of uncertainty by providing a stable relationship through validation, opportunities for ventilation, or instrumental support and by minimizing social uncertainties through acts that project availability of support and lack of stigmatization or rejection. Supportive others influence appraisal processes by encouraging people to refocus on other salient questions; to reappraise uncertainty as either danger, opportunity, or inconsequential; or to change their perspective to view uncertainty as a normal part of life. Supportive others act upon uncertainty management processes by providing direct or indirect assistance as sources of information, collaborators in information gathering, evaluators of information, or buffers against information.

Managing uncertainty management. Brashers, Neidig, Haas, et al. (2000) noted that uncertainty management can be complicated by the nature of information or the intrinsic complexity of information seeking and avoiding. Information may be more or less available, information from different sources can be inconsistent or contradictory, and information can increase or decrease uncertainty. Social skills needed to seek or provide information and cognitive capacity needed to comprehend, integrate, and apply it, can vary from individual to individual and from situation to situation. If people use hesitant language styles for passive information seeking, others may not hear the expression of uncertainty as a request for information. The need to balance uncertainty management with other tasks (e.g., identity management) often results in competing goals (Callister, Kramer, & Turban, 1999; Goldsmith, this issue). Dilemmas of social support in managing uncertainty arise from difficulty coordinating the goals of support seekers and support givers (e.g., one might focus on reducing uncertainty while the other focuses on increasing or maintaining uncertainty; see Brashers, Neidig, & Goldsmith, 2000) or from costs associated with seeking support (e.g., seeking social support might be hindered when disclosure of personal weakness or lack of knowledge makes one feel vulnerable or dependent; Albrecht & Adelman, 1987).

The means of coping with problems of uncertainty management correspond to these dilemmas (Brashers, Neidig, Haas, et al., 2000). Because health information can be challenging and difficult to interpret, many people with HIV have educated themselves about technical aspects of the disease to facilitate dialogues with physicians, pharmaceutical companies, government agencies, and other health care experts (Brashers, Haas, Klingle, & Neidig, 2000). Individuals managing uncertainty learn to be vigilant when information is not easily obtained, to assess the credibility of information sources, and to accommodate for their own and others' deficits in information-seeking and cognitive-processing ability (e.g., by using an advocate to assist them). When they face competing tasks, they can sublimate one goal for another. Dilemmas of social support and uncertainty management can be

dealt with by developing self-advocacy skills, reframing support attempts as helpful to the support provider, accepting a lack of support, withdrawing from social situations, selectively allowing others to be support persons, and maintaining boundaries about topics of conversation (Brashers, Neidig, & Goldsmith, 2000).

People also manage and manipulate the uncertainty of others. For example, physicians sometimes communicate to account for their own and their patients' uncertainty (Hewson, Kindy, Van Kirk, Gennis, & Day, 1996), including withholding potentially distressing information such as a cancer diagnosis (Yaniv, 2000). Supportive others may provide unsolicited information and advice to individuals they believe need or desire uncertainty reduction (Brashers, Neidig, & Goldsmith, 2000; Kramer, Callister, & Turban, 1995). Tyler (1997) found that, because of concerns about corporate liability, organizations use strategic ambiguity (Eisenberg, 1987) in crises when confronted with charges of unethical behavior. Messick (1999) argued that organizations sometimes manage others' uncertainty through "smoke machines" that are "designed to obscure, blur, confuse, distract, or otherwise direct attention away from some features of an issue, and possibly toward other, less unfavorable aspects of it" (p. 75). Uncertainty management efforts therefore also may need to be adapted to the influence of others.

Summary

We should continue to focus on three connected areas: the experience and meaning of uncertainty, appraisal and emotional responses to uncertainty, and corresponding behavioral interventions. Research in health, organizational, and relational contexts demonstrates increasing attention to these matters. The need to further expand and apply theories of uncertainty management and the limitations of focusing exclusively on information seeking and uncertainty reduction are readily apparent in health education and disease prevention efforts.

The Culture of Chronic Illness

The communication of health risk information for disease prevention and control has increased rapidly over the past 2 decades, perhaps due to the development of probability statistics that aid in forecasting disease and illness (Skolbekken, 1995), to advanced applications of genetic profiling (Baum, Friedman, & Zakowski, 1997; Cunningham-Burley & Boulton, 2000), and to increased sophistication of "surveillance medicine" technologies (Armstrong, 1995). Epidemiological information about risk can be derived from behavioral factors such as eating "unhealthy" foods, smoking or chewing tobacco products, drinking alcohol, or taking drugs, and from markers such as familial history or genetic predispositions to diseases such as cancer and heart disease. People are encouraged to perform self-exams on their breasts or testicles, get regular mammograms or prostate screening, and check their cholesterol levels and blood pressure. Surveillance medicine today supposes a person or population who hang "precariously between health and illness" (Armstrong, 1995, p. 396).

Communicating risk information is intended to reduce uncertainty about the

likelihood of disease and death by allowing people to estimate those probabilities. If a primary goal of science is to achieve predictability (Baxter & Montgomery, 1996), the corresponding benefit of health sciences to the general population is the ability to enhance prediction and control over disease in our lives. Advances in science and the practice of health care make uncertainty reduction a primary means by which disease prevention and control occurs. People are besieged with risk messages from birth (Dobbs, 1999; Lupton, 1999) and utilization of resources for monitoring health has increased dramatically (Armstrong, 1995).

This drive to reduce uncertainty about the state of health and illness has led to a culture of chronic illness. Constant surveillance of people's health combined with improved methods for screening and monitoring virtually guarantee finding disease or potential for disease in every person, creating a society divided into the chronically ill and worried well. In general, although the overall health of the American public has improved dramatically over the past few decades, the average perceived well-being and level of satisfaction with health have declined (Barsky, 1988; Førde, 1998). Perhaps greater awareness and greater vigilance about health risks over the years have increased anxiety about disease and illness (e.g., Franzini, 1993).

Messages supporting the "ideology of uncertainty reduction" (Babrow & Kline, 2000), which characterizes risk communication, pervade our society. Skolbekken (1995) referred to frequent references to "risk, hazard, danger and uncertainty" (p. 291) in medical journals as a risk epidemic. Researchers have argued that some of these efforts are well intentioned but ill advised. For example, Woloshin and Schwartz (1999) argued that the prostate cancer awareness stamp issued by the U.S. Postal Service encourages "annual checkups and tests" despite a lack of scientific evidence for the benefits of testing and a lack of support for the recommendation from major medical associations. They noted that, "ironically, rather than inspiring people to lead more health-conscious lives, the images and message chosen for the stamps promoting health and early detection of disease may actually lead to confusion, anxiety, and an unhealthy preoccupation with illness" (p. 887).

There is no doubt that benefits of health screening and education can be considerable. Tests for some conditions provide control of sorts, for example, the ability to change the probability of illness through prophylaxis, treatment, and behavioral modification (Baum & Posluzny, 1999; Shiloh, Ben-Sinai, & Keinan, 1999). Early detection of cancer may be the best hope for cure. Cholesterol screening can encourage diet modification to prevent heart disease. However, even circumstances in which remedy may be available are not unproblematic. The *Chicago Tribune* recently reported the story of woman whose genetic testing indicated a high likelihood of breast and ovarian cancers (Peres, 1999). After undergoing a prophylactic oophorectomy (removal of the ovaries) and agreeing to frequent monitoring of her breasts to avoid a prophylactic mastectomy (removal of the breasts), an error in her test results was discovered. She had been given the results of another woman and her own tests turned out to be unremarkable. Her story is important for two reasons: First, genetic testing intended to reduce uncertainty about cancer potential created such anxiety in the woman that she was willing to

undergo radical surgery in the absence of any sign of cancer. Rather than opting to closely monitor her health, she chose to eliminate the ongoing uncertainty that would accompany that choice. Second, the tragic circumstance of the switched test result, and the very public display of that error, will lead to new uncertainties about the accuracy and reliability of testing procedures for herself and others. Although most tests may be unproblematic because they reveal no risk for disease or because the results are given to the correct patient, the chance for mistakes calls into question the rationality of decision making based on those results.

This case also shows how the line between preventive and therapeutic medicine has been blurred. As technologies for surveillance improve, our ability to detect disease and tendency toward disease increases, so that everyone needs some form of ongoing health care and attention. Meador (1994) speculated, "If the behavior of doctors and the public continues unabated, eventually every well person will be labeled sick" (p. 440). He described his imagined "last well person" as the one who has escaped diagnosis of disease:

> His medical workups are lengthy. Every orifice has been subjected to endoscopy at least once, and most of them annually. He has had countless computed tomographic scans, magnetic resonance imaging scans, and one scan by positron-emission tomography—all of which were normal. He has had one biopsy of his thyroid and two of his prostate. He regularly gets profiles of his blood and urine chemistry. At no time has any test or procedure yielded a positive or abnormal result that remained abnormal when the test was repeated.
>
> This is how I suppose the last well person might appear. It is miraculous that he escaped being labeled with a disease for so long, and incredible that he missed being given a false diagnosis. In my imagined meeting with the last well person, I can hear myself saying "Doing all those boring things you do to stay healthy may or may not make you live longer. However, I am sure of one thing; it will make your life seem longer."
>
> The last well person will not smile. Escaping disease in the 1990s is very serious business. (p. 441)

That, furthermore, is the business of communicating risk and reducing uncertainty. Because we have adopted a model of health that involves constantly looking for disease, everyone essentially is chronically ill. Although the benefits of testing are sometimes great (e.g., finding a malignancy early so it can be treated successfully), the psychological costs of surveillance must also be weighed. Especially in cases in which treatment or prophylaxis is not available and those in which the outcomes of a positive result are devastating (e.g., revealing a terminal or life-threatening illness), people may be so disturbed by information they avoid it at all costs.

Much current health education practice supports this biomedical model of health and illness. We must constantly look for signs of disease to evaluate health when health is measured by the absence of disease (Meador, 1994). Therefore, we tend to focus on the physical rather than addressing the physical and psychosocial aspects of health (Zook, 1994). As Førde (1998) noted, "the inconsistency be-

tween applying an expanded health concept, comprising elements of coping, self realisation, and psycho-physical functioning, and imposing intolerance to risk and uncertainty, is regularly overlooked" (p. 1155). He added that "increased risk awareness not only changes the way people think about health, disease and death. More profoundly, and more seriously, it ultimately changes human values, self-identity and our perspective on life" (p. 1157).

Advancing the Theory and Practice of Uncertainty Management

Despite important advances in theories of uncertainty management, there is still evidence that our thinking is limited by the uncertainty reduction paradigm (also see Babrow, this issue). Kramer (1999) recently offered an alternative to uncertainty reduction theory (Berger & Bradac, 1982) that could be useful for explaining the variability in responses to uncertainty, but by labeling it a theory of "motivation to reduce uncertainty," he subtly limits the range of responses that might be explored. Because we typically orient to reducing uncertainty rather than managing it, we fail to examine the volition of social actors in determining uncertainty management processes. When we theorize about communication processes, we must attend to the broader conceptions of uncertainty that we now know exist. We have to remind ourselves that "uncertainty" and "anxiety" are not synonyms; correspondingly, "reducing uncertainty" is not the same as "managing the effects of uncertainty." We must be aware that uncertainty cannot always be reduced (Berger, 1995), but that anxiety and the desire to reduce uncertainty can become pathological (Giarelli, 1999).

Should we teach people that reducing uncertainty is the best route to decision making? Perhaps. In our society, knowledge is considered the most basic form of human wealth (Merry, 1995). Many normative theories of group and organizational decision making and problem solving emphasize a rational optimizing strategy (Simon, 1956) in which all available information is gathered and analyzed, decision alternatives are carefully weighed, and the most viable or attractive alternative is selected. We need, though, to understand the costs associated with recommending uncertainty reduction as an optimal decision-making strategy. People may be distressed by information, which may lead them to avoid situations in which they would encounter it. Health care settings or support groups may threaten feelings of hope and optimism that people with chronic or life-threatening illness need to sustain themselves (Brashers, Neidig, Haas, et al., 2000). Similarly, risk assessment and awareness education can be problematic when the information becomes overwhelming. A recent study of over 35,000 adults tested for HIV revealed that roughly 13% never received their test results (Tao, Branson, Kassler, & Cohen, 1999). The percentage was much higher (24%) for those whose tests were not self-initiated (e.g., those who were tested for hospitalization, surgery, or immigration purposes). Although the science of epidemiology and its contribution to forecasting disease is important to public health (Savitz, Poole, & Miller, 1999), providing information may be counterproductive if it decreases rather than in-

creases people's attention to health and well-being. When we decide that people do need risk information, we should develop strategies for providing it in ways that minimize distress and maximize processing ability (Bottorff, Ratner, Johnson, Lovato, & Joab, 1998).

Questioning assumptions about uncertainty and its management also might make us question some of our basic ideas about the character and functions of scientific information. For example, we might consider that "laws of nature" emerge, develop, and change over time (Merry, 1995; Prigogine & Stengers, 1997) or that "causality, a cornerstone of all science, is neither a force nor a substance, but a linguistic device for helping us to organize our understanding of the predictable in nature" (Beahrs, 1986, p. 2). We might acknowledge the subjectivity inherent in interpreting and applying scientific information and in arguing for its validity. In the silicone breast implant controversy, various stakeholders (physicians, women with breast implants, scientists, and government agencies) had motivations for supporting or refuting claims about the danger of those devices (Vanderford & Smith, 1996). Perhaps because scientific evidence still was developing at the time, people interpreted and applied it in ways that supported their interests.

The paradox of science is that our world seems to become more predictable and controllable at the same time it is becoming more complex and chaotic. We hear people "yearn for the simpler times of the past" as they simultaneously herald the use of sophisticated technologies that speed production, facilitate communication, and encourage multitasking. As mechanisms of control and knowledge domains become more advanced, the need for specialization and expertise increase. Although the principal goal of science may be uncertainty reduction to achieve predictability and control, "perhaps the most common outcome of the scientific process is not facts, but uncertainty" (Friedman, Dunwoody, & Rogers, 1999, p. vii).

Goldsmith's (1992, this issue) call for normative theories is particularly attractive given the application of uncertainty management to many basic human tasks and goals, including disease prevention and control. Normative theories help to explain differences between what people do and what people should do to manage uncertainty effectively (Brashers, Neidig, Haas, et al., 2000). For example, Conley, Taylor, Kemeny, Cole, and Visscher (1999) studied gay men who were tested for HIV. Those who chose not to learn their test results had higher levels of anxiety about HIV than those who did choose to learn their results, perhaps suggesting that those with greater worry about being infected wanted to maintain their uncertainty (as a theory of uncertainty management would suggest). However, Conley et al. noted that "both HIV-seropositive and HIV-seronegative men who were initially unaware [i.e., did not receive their test results] showed a decline in mood disturbance on learning their HIV status. These findings suggest that learning threatening information may be more psychologically beneficial than avoiding it" (p. 81). Information was useful to decrease anxiety, even for those who initially had avoided it. Normative models should account for the incongruence between goals and outcomes in uncertainty management situations such as that.

Conclusion

Uncertainty experiences and the corresponding appraisals, emotional responses, and behaviors that accompany them reveal a great deal about communication functions in human action. In some instances, people may want to reduce uncertainty because they find it threatening. At other times, uncertainty allows people to maintain hope and optimism. Across contexts, people engage in or avoid communication so that they can manipulate uncertainty to suit their needs. Theories of uncertainty management that account for these factors have important consequences for the practice of health care, for functioning in organizations, and for developing and sustaining relationships.

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